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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/644,964	08/21/2003	Tsutomu Shoki	Q77092	7584

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EXAMINER	
ROSASCO, STEPHEN D	
ART UNIT	**PAPER NUMBER**
1756	

DATE MAILED: 07/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/644,964	SHOKI ET AL.	
	Examiner	Art Unit	
	Stephen Rosasco	1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 June 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *24 June 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *8/21/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Detailed Action

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-9 are rejected under 35 U.S.C. 102(e) as being anticipated by Tong et al. (6,352,803).

The claimed invention is directed to a method of manufacturing a reflection type mask blank by forming a multilayer reflection film reflecting exposure light on a substrate and forming an absorber layer absorbing the exposure light on the multilayer reflection film, the method comprising: a step of forming, between the substrate and the multilayer reflection film, on the multilayer reflection film, or both between the substrate and the multilayer reflection film and on the multilayer reflection film, a stress correction film having film stress opposite in direction to film stress of the multilayer reflection film and smaller in absolute value than the film stress of the multilayer reflection film; a step of heat-treating the stress correction film; and a step of heat-treating the multilayer reflection film.

And wherein the step of heat-treating the stress correction film and the step of heat-treating the multilayer reflection film are carried out simultaneously.

And wherein the stress correction film is formed on the substrate, the stress correction film is heat-treated, the multilayer reflection film is thereafter formed on the stress correction film, and the multilayer reflection film is heat-treated.

And wherein the heat treatment is carried out at a substrate heating temperature higher than a temperature upon deposition of the stress correction film and not higher than 200 C.

And herein the stress correction film is increased in stress in a tensile direction by the heat treatment.

Tong et al. teach (see claims) a process for creating a mask substrate involving depositing: 1) a coating on one or both sides of a low thermal expansion material EUVL mask substrate to improve defect inspection, surface finishing, and defect levels; and 2) a high dielectric coating, on the backside to facilitate electrostatic chucking and to correct for any bowing caused by the stress imbalance imparted by either other deposited coatings or the multilayer coating of the mask substrate. An film, such as TaSi, may be deposited on the front side and/or back of the low thermal expansion material before the material coating to balance the stress. The low thermal expansion material with a silicon overlayer and a silicon and/or other conductive underlayer enables improved defect inspection and stress balancing.

Tong et al. also teach a process for fabricating a mask substrate containing at least a multilayer structure on the front side of a substrate, the improvement comprising: forming the substrate of low thermal expansion material, forming a layer of material intermediate the substrate and the multilayer structure to enhance defect inspection, improve surface finishing, reduce defect levels, and correct stress imbalance, said layer of material being selected from the group consisting of silicon, molybdenum, chromium, chromium oxynitride, TaSi, and Mo/Si multilayers, and forming at least one layer of material on the backside of the substrate to facilitate at least one of the group of electrostatic chucking, enhance defect inspection and correct for bowing of the substrate caused by stress imbalance.

And wherein the first-mentioned layer of material is composed of silicon, and additionally including forming a layer of stress balancing material between the front side of the substrate and the silicon layer.

Tong et al. (see col. 5, section 5) also teach that the coating on the backside can also be used to correct the bow caused by the ML on the front. The thickness of the back coating depends on what is required to correct the stress imbalance the substrate and its other coatings. A coating of silicon, molybdenum, chromium, chromium oxynitride, TaSi, or a Mo/Si ML stack can be used. In particular, coatings such as TaSi and chromium oxynitride, whose stress is adjustable by annealing, can also be tailored to meet the stress-balancing need of individual masks.

Tong et al. does not expressly teach the measure of film stress before annealing as to the amount or tensile direction of the stress, but these measures would be expected to be inherent from the fact that the materials and construction are the same.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tong et al. (6,352,803) in view of Brooks et al. (6,696,205).

The claimed invention is directed to a method of manufacturing a reflection type mask blank by forming a multilayer reflection film reflecting exposure light on a substrate and forming an absorber layer absorbing the exposure light on the multilayer reflection film, the method comprising: a step of forming, between the substrate and the multilayer reflection film, on the multilayer reflection film, or both between the substrate and the multilayer reflection film and on the multilayer reflection film, a stress correction film having film stress opposite in direction to film stress of the multilayer reflection film and smaller in absolute value than the film stress of the multilayer reflection film; a step of heat-treating the stress correction film; and a step of heat-treating the multilayer reflection film.

And wherein the step of heat-treating the stress correction film and the step of heat-treating the multilayer reflection film are carried out simultaneously.

And wherein the stress correction film is formed on the substrate, the stress correction film is heat-treated, the multilayer reflection film is thereafter formed on the stress correction film, and the multilayer reflection film is heat-treated.

And wherein the heat treatment is carried out at a substrate heating temperature higher than a temperature upon deposition of the stress correction film and not higher than 200 C.

And herein the stress correction film is increased in stress in a tensile direction by the heat treatment

Tong et al. essentially teach the claimed invention as described above and included here.

The teachings of Tong et al. differ from those of the applicant in that the applicant teaches that Tong et al. does not expressly teach a measure of film stress before and after annealing with respect to the amount or tensile direction of the stress.

Brooks et al. teach as illustrated in FIG. 2, a lot of fifteen (15) substrates were provided with the membrane layer followed by the thin transition metal-based scattering layer thereover. The initial as-deposited stresses of the thin transition metal-based scattering layer over the substrates were measured and an initial average of the as-deposited stress of -743 Mpa was obtained.

Subsequently, the first substrate was annealed at a temperature of about 380 degree C and then the annealed thin transition metal-based scattering layer stress of the second substrate was measured. An annealed thin transition metal-based scattering layer stress of about 32 Mpa was obtained, which is lower than the target value of 50 Mpa.

Next, the second substrate was annealed at a temperature of about 391 degree C and then the annealed thin transition metal-based scattering layer stress of the second substrate was measured. An annealed thin transition metal-based scattering layer stress of about 105 Mpa was obtained, which is higher than the target value. A third substrate was then annealed at about 385 C and exhibited a stress of about 49 Mpa, which is considerably close to the target value of 50 Mpa. The remaining substrates within the lot having the thin transition metal-based scattering layer thereover were then annealed at the temperature of about 385 degree C.

The annealed stresses of the thin transition metal-based scattering layer over the remaining thirteen (13) substrates were then measured and an average annealed stress for the 13 substrates annealed at about 385 degree C was 51 Mpa and the average equilibrated stress for these substrates was about 16 Mpa, as further discussed below.

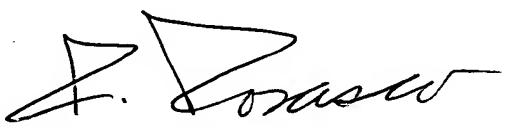
It would have been obvious to one having ordinary skill in the art to take the teachings of Tong et al. and combine them with the teachings of Brooks et al. in

order to make the claimed invention because it is well known in the art that heat treating layers on a substrate relieves the stresses in the layers and the materials of the cited references are similar therefore one would expect that the values of stress cited in Brooks et al. would be similar to those achieved by Tong et al.

Conclusion

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Stephen Rosasco whose telephone number is (571) 272-1389. The Examiner can normally be reached Monday-Friday, from 8:00 AM to 4:30 PM. The Examiner's supervisor, Mark Huff, can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



S. Rosasco
Primary Examiner
Art Unit 1756

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07/08/05